CURRICULUM VITAE

Dr. Hina Khan Ph.D., B.Sc.

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Profile

I am an experienced and highly motivated research physicist with particular expertise combining satellite and ground-based radar data to probe the upper atmosphere and the interactions between the Earth and the solar environment. For my Ph.D. thesis, I investigated the ionospheric response for changes in the interplanetary magnetic field to become apparent in the high-latitude ionospheric flow. My research involved a large amount of data which was analysed in a statistical manner to ascertain the time scales involved with the solar wind-magnetospheric coupling process. Through this type of research, I have developed a thorough and methodical approach and can perform ably on both an individual basis and as the member of a team. I have gained considerable experience in communicating my scientific research in both a scientific and non-scientific environment in an efficient and coherent manner through written and oral presentations. I have also been involved with the Cassini project whereby I investigated the data collected during the Cassini Earth flyby, and used ground-based instrumentation to help put the Cassini data in context. Currently I am studying features observed by the ESR radar, and together with HF radar and satellite information, trying to identify reconnection events at the dayside magnetopause.

Finally I have recently taken up the position as a Research Associate on the NRC program working at the NASA Goddard Space Flight Center on the IMAGE project. My work principally involves the Low-energy neutral atom imager on this spacecraft, and I will be investigating the principles of ionospheric outflow events. I hope to combine the experise I have gained during my postdoctoral research and combine the space-based mission of LENA with ground-based instrumentation to understand the outflow events.

Key Skills

- Undertake scientific research into upper atmospheric physics, geophysics and solar-terrestrial interactions using both satellite and ground-based instrumentation.
- Experience in the analysis of large geophysical data sets, including data from ground-based radars, such as EISCAT, and satellite instruments, such as the magnetometer and plasma instruments on both WIND and IMP-8.
- Able to classify geophysical phenomena, such as substorms, through analysis of ground magnetometer data and spacecraft data.
- Development of software for the visualisation of data, with particular expertise in the IDL language.

- Software development in C and FORTRAN languages.
- Communication of complex ideas to both scientific and non-scientific personnel.
- Teaching undergraduate students maths and physics through seminars for the last 3 years.
- Organisation of my time to efficiently conduct my research without compromising my teaching commitments.
- Full working knowledge of UNIX, DOS, Windows NT and Apple Macintosh operating systems running on various architectures including SGI, SUN, and Hewlett Packard.
- Application of the HTML internet language for information exchange.
- Familiarity with the internet using web browsers.
- Expertise in HF and UHF auroral radar techniques and their operation.
- Construction of posters and display boards illustrating the role of the solar wind-magnetosphere-ionosphere coupling process, and the formation of aurora or Northern Lights.

Principal Achievements

- Completion of Ph.D. Thesis in Space Physics and Solar-Terrestrial studies.
- Research in the field of solar-terrestrial physics, specialising in the interaction of the Earth's atmosphere with the ionised region of geospace, the ionosphere.
- Large statistical analysis of the solar-terrestrial interaction in the upper atmospheric region, principally involving the physical processes resulting from the interaction.
- Oral and poster presentations of scientific results at international and national scientific assemblies.
- Design and development of a 3-D terrestrial magnetic field model to monitor the effect of the solar environment on the Earth.
- Publication of scientific research in refereed journals.
- Preparation of presentational material to promote the group's activities to a wider audience of persons both scientific and non-scientific.
- Member of a UK team involved in the co-ordination and operation of an international radar facility located in Northern Scandinavia.

Employment

Nov 2001 – present Fellowship award on the NRC Research Associateship program

Oct 1999 – Nov 2001 Research Associate in the Radio and Space Plasma Physics Group, University of Leicester, Leicester, England.

My work at the University of Leicester has been multi-faceted where I carried out research in many areas of solar-terrestrial physics. My most recent research has been to study the consequences and data from the Cassini/Earth flyby in August 1999. My task in the project was to collate all the ground-based and space-based data for the interval of interest and then to discuss the Cassini observation in light of the geophysical processes occurring at the time.

I am also investigating the merits of the ESR radar in conjunction with the CUTLASS HF

project and trying to explain the large scale magnetospheric configuration during the ESR data run which could produce the observed radar features. By using radar with overlapping fields-of-view the motion and nature of features observed in both radar can be determined, and subsequently an explanation about the larger picture can be ascertained.

I also aided in the development of the scientific programme for a new space mission (APEX), which has been presented to ESA for approval and ultimately, for funding.

Main Duties and Responsibilities

- Conducting research into magnetospheric and ionospheric physics, employing ground and space-based observations.
- Evaluation of a large high-latitude ionospheric database, utilising multi-instrument data.
- Clear presentation and publication of results.
- Development of software for analysis of the available data.
- Providing scientific information for new projects such as space missions, which require funding from commercial agencies and institutions.
- Supervision of both undergraduate project students and postgraduate students.
- Teaching and grading in an undergraduate physics laboratory.
- Tutored Mathematics and Physics to undergraduates.
- Nominated *Faculty Representative* during my third year as an undergraduate student enabling me to experience the running of the Faculty and act as a liaison between the student and the staff.
- Maintaining the group's library journals.

Educational Profile

1996 - 1999 Radio and Space Plasma Physics Group, Department of Physics and Astronomy, University of Leicester.
Ph.D.: "Response of the high-latitude ionospheric convection to changes in the interplanetary medium"

1992 - 1996 Department of Physics and Astronomy, University of Glasgow.
BSc. (Hons) in Physics and Astronomy, 2nd class.

1986 - 1992 Cumbernauld High School, Cumbernauld, Glasgow.
3 CSYS: Pure Mathematics (B), Abstract Mathematics (C), Physics(B),
5 Higher-Grades: English (A), Mathematics (B), Physics (B), Chemistry (A), Latin (B)
8 O-Grades/Standard-Grades: including English Language and Urdu.

Awards and Merits

- Awarded ***Class Exemptions and Merit Awards*** for *all subjects* in both 1st and 2nd years during my undergraduate degree.
- Awarded funding from the University of Leicester for a 3-year period to conduct research for a Ph.D.

Personal interests

I actively participate in sports, playing badminton and squash on a regular basis. I am also an active member of the local health club where I regularly go swimming and do aerobic exercise. I have an interest in astronomy and own a 6-inch f/8 Newtonian Reflector telescope. I also enjoy more leisurely pursuits such as walking, cycling, reading, cooking.

Other useful information

I have held a full clean driving license since September 1992. Also I am fluent in both written and spoken Urdu. I am a graduate member of the Institute of Physics, and the American Geophysical Union.

Publications and Conference proceedings

Publications

H. Khan, M. Lester, J.A. Davies, S.E. Milan and P.E. Sandholt, 'Multi-instrument study of the dynamic cusp during dominant IMF B_y conditions', submitted *Annales Geophysicae*, 2001.

J.A. Wild, S.W.H. Cowley, J.A. Davies, **H. Khan**, M. Lester, S.E. Milan, G. Provan, T.K. Yeoman, A. Balogh and M.W. Dunlop, 'First simultaneous observations of flux transfer events at the high-latitude magnetopause by the Cluster spacecraft and pulsed radar signatures in the conjugate ionosphere by the CUTLASS and EISCAT radars', *Ann. Geophysicae*, **19**, 1491-1508, 2001.

H. Khan, S.W.H. Cowley, E. Kolesnikova, M. Lester, D.J. Southwood, C.J. Owen, C.W. Smith, D.J. McComas, H.J. Singer, G.D. Reeves, M.J. Brittnacher, T.J. Hughes, L. Newitt, W.J. Hughes, J.F. Watermann, 'Observations of Two Complete Substorm Cycles During the Cassini Earth Swing–By: Cassini Magnetometer Data in a Global Context', *J. Geophys. Res.*, **106**, 30140-30175 2001

T.K. Yeoman, **H. Khan**, S.W.H. Cowley, R.V. Lewis, J.M. Ruohoniemi, 'Interhemispheric HF radar observations of nightside ionospheric convection in response to IMF B_z and B_y changes and substorm pseudobreakup', *Proc. 5th Intern. Conf. on Substorms* (ESA SP-443), 103-106, 2000.

T.K. Yeoman, R.V. Lewis, **H. Khan**, S.W.H. Cowley, J.M. Ruohoniemi, 'Interhemispheric observations of nightside ionospheric electric fields in response to IMF B_z and B_y changes and substorm pseudobreakup', *Annales Geophysicae*, **18**, 897-907, 2000.

H. Khan and S. W. H. Cowley, 'Effect of the IMF B_y component on the ionospheric flow overhead at EISCAT: Observations and theory', *Annales Geophysicae*, accepted, 2000.

H. Khan. 'Response of the high-latitude ionospheric convection to changes in the interplanetary medium' *Ph.D. Thesis*, University of Leicester, 1999.

H. Khan and S. W. H. Cowley, 'Observations of the response time of high-latitude ionospheric convection to variations in the interplanetary magnetic field using EISCAT and IMP-8 data,' *Annales Geophysicae*, **17**,1306-1335, 1999.

S. W. H. Cowley, **H. Khan** and A. Stockton-Chalk, 'Plasma flow in the coupled magnetosphere-ionosphere system and its relationship to the substorm cycle.' *Substorms 4* (ed. S. Kokuburn and Y. Kamide), Kluwer Academic Publishers, pp. 623, 1998.

Invited presentations

H. Khan and J.A. Wild, Bow Shock, Magnetosheath, Magnetosphere, PPARC Introductory Course in Solar-Terrestrial Physics, University of Wales, Aberystwyth, 2001.

H. Khan, Mechanisms and response time of high-latitude ionospheric convection to interplanetary magnetic field changes', IAGA-IASPEI Joint Scientific Assembly, Hanoi, Vietnam, 2001.

H. Khan, Observations of Two Complete Substorm Cycles During the Cassini Earth Swing–By: Cassini Magnetometer Data in a Global Context, XXVI European Geophysical Society General Assembly, Nice, France, 2001.

Oral presentations

H. Khan, 'Effect of the Y component of the IMF on the flow on closed auroral zone field lines: Observations by EISCAT', 9th International EISCAT Workshop, Wernigerode, Germany, September, 1999.

H. Khan, 'Statistical analysis of high-latitude ionospheric flows associated with the asymmetric effect of the Y component of the IMF', IUGG 99, Birmingham, July, 1999.

H. Khan, 'Investigation of dayside and nightside ionospheric response delays to changes in the IMF conditions using simultaneous satellite and EISCAT data', XXIII European Geophysical Society General Assembly, Nice, France, April 1998.

Poster presentations

H. Khan, Multi-instrument case study of the dynamic cusp, XXVI European Geophysical Society General Assembly, Nice, France, 2001.

H. Khan, Response times of the high-latitude ionospheric convection due to variations in the IMF conditions, Advanced Solar Systems Plasma Course at the University of Leicester, September 1998.

Academic Reference

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